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Jet Drift in Flowing Nuclear Media[1]

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Jets have long been envisioned as a source of tomographic information about hot and cold nuclear media, with signatures such as their energy loss, acoplanarities, and substructure encoding information about the microscopic details of the medium. The theory fundamentally relies on a significant separation of scales in which the jet energy far exceeds the temperature and other characteristic scales of the nuclear medium. In the strict limit under which these formulas are derived, the constituents of the medium are effectively static, with corrections sensitive to the motion of medium particles being suppressed by the jet energy. In this talk, we report on a new calculation of these energy-suppressed corrections which are sensitive to the velocity distribution of the medium. We show that these corrections lead to significant qualitative modifications of the usual jet-medium interactions, including collisional energy gain or loss, direction-dependent shifts in the scattering cross section, and new types of quantum interference phases. The result, applicable both to heavy-ion collisions and to cold nuclear matter at the Electron-Ion Collider, is a drift effect which drags the jet in the direction of the velocity field and alters the angular distribution of its radiation pattern.

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